ADDIS COLLEGE

Faculty of Technology

Construction Technology and Management

MSc. thesis on:

THE EFFECT OF TIME EXTENSION ON COST OVERRUN; IN CASE OF SELECTED ROAD PROJECT IN ADDIS ABABA

By:

BIRHANU HAILU.

Advisor:

ARGAW ASHA (PHD)

May, 2024
Addis Ababa, Ethiopia

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Thesis Submitted to the Department of Construction Technology and Management in partial Fulfillment of the Requirement for obtaining Masters of Technology in Construction Management in Addis College Graduate Studies Program

Main Advisor: ARGAW ASHA (PHD)

May, 2024
ADDIS ABABA

ADDIS COLLEGE

SCHOOL OF GRADUATE STUDIES

CONSTRUCTION MANAGEMENT PROGRAM

THESIS PROPOSAL APPROVAL SHEET

I hereby certify that I have supervised, read, and evaluated this thesis title "***The Effect Of Time Extension On Cost Overrun In Case Of Selected Road Project In Addis Ababa"*** prepared by Birhanu Hailu under my guidance. I recommend the thesis to be submitted for oral defense**.**

_____	_____	_____
Advisor's name	Signature	Date

APPROVAL SHEET

ADDIS COLLEGE

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THE EFFECT OF TIME EXTENSION ON COST OVERRUN; IN CASE OF SELECTED ROAD PROJECT IN ADDIS ABABA

BY :BIRHANU HAILU

APPROVED BY THE COMMITTEE EXAMINERS

ARGAW ASHA (PHD)

Advisor Name

_____	_____	_____
	Date	Signature
_____	_____	_____
External Examiner Name	Date	Signature
_____	_____	_____
Internal Examiner Name	Date	Signature
_____	_____	_____
Chair Person	Date	Signature

DECLARATION

This is to certify that the thesis entitled "***The effect of time extension on cost overrun in the case of a selected road project in Addis Ababa,***" submitted in partial fulfillment of the requirement for the degree of master of construction technology and management under the Faculty of Technology, Addis Collage, is the record of the original work carried out by me and has never been submitted to this or any other institution to get any other degree certificate. The assistance and help I received during the course of this or any other degree or certificate. The assistance and help I received during the course of this investigation have been duly acknowledged.

By Birhanu Hailu _____ _____

Signature **Date**

ADDIS COLLEGE, ADDIS ABABA

LETTER OF CERTIFICATION

This is to certify that Birhanu Hailu has carried out this research work on the topic entitled "the effect of time extension on cost overrun; in case of selected road project in Addis Ababa" under my supervision. This work is original in nature and suitable for submission in partial fulfillment of the requirements for the award of Master of Technology Degree in Construction Management.

Advisor- **Argaw Asha (PHD)** Signature _____ Date _____

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Abstract

The purpose of this research was to identify the effect of an extension of time on the cost overrun of the project. The research used both quantitative and qualitative data, which were collected and analyzed. Both primary and secondary data were used to answer the research questions. Desk studies of the main three road construction projects were assessed, and from the analysis, it was found that most of the road construction projects suffered from both time extensions and cost overruns. A total of 100 questionnaires were distributed, and 76 questionnaires were returned and collected, resulting in an overall response rate of 76% from MELCON, ECWC,IFH office engineers, project managers, and site engineers, including client and consultant officers. A structured questionnaire on a Likert scale was used in the data collection system. The data obtained through the questionnaire had been analyzed quantitatively using Excel. Further, the data obtained through the interview had been analyzed qualitatively. The design is a mixed approach. Major extension-of-time project attributes were identified through a detailed literature review. This research categorized the causes of extension of time under three main groups: contractor-related factors, client-related factors, consultant-related factors, other external-related factors, project-related factors, design-related factors, material-related factors, and labor- and equipment-related factors. The data obtained was then analyzed using the relative importance index (RII). Based on the RII result, the findings of the research are that the major causes of the extension of time include improper planning. poor site management and supervision, incomplete drawing and detail design, poor contract management, unforeseen circumstances, mistakes, inconsistencies and ambiguities in specifications and drawings, shortage of construction materials required, and low capability of the contractors' specialized staff doled out to the project, while the major causes of cost overrun were price escalation, quantity underestimation, design change, lack of quality, delayed caused by the owner and his/her specialist, poor cost management, additional work and rework, incomplete requirements and design.Finally, some recommendations have been delivered under this study on what actions should be taken to tackle the two major problems to solve extension of time with the project cost.

Key Words: extension of time, cost overrun, effect, resolution

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Abbreviations

AACRA	Addis Ababa City Road Administration
ECWC	Ethiopia Construction Work Corporation
EOT	Extension of time
GC	General Contractor
RII	Relative Importance Index
NPRA	Norwegian Public Roads Administration

Chapter one
Introduction

1.1Back ground of the study

The history of road construction in Addis Ababa City dates back to the city's establishment by Menelik II and Empress Taitu in 1887 (AACRA, 2021). The history of the city's road development also begins with the inception of the city. Menelik II constructed the first ever two roads in the city as well as in the country, which stretch from Addis Ababa to Addis Alem and from his palace to the British Embassy. But the Addis Ababa City Roads Authority was established on March 15, 1998, by regulation No. 7/1998 to be administered by a board of directors to construct, maintain, and administer the road works in Addis Ababa. The authority has made significant progress in city road expansion and upgrading since its establishment (AACRA, 2020).

The effect of time extension is concurrent delay, which means delays caused by the contractor and by employers as well. Time extension effects are delays in finishing a project that can result in disagreements, cost overruns, and even project termination. Research carried out in Sarawak concentrated on the causes of project delays and the issuance of extensions of Contractors often seek extensions of time to avoid penalties and liquidated damages and gain additional time to complete projects.

AACRA is responsible for constructing, maintaining, and administering the road works in Addis Ababa. According to Godifaye (2007), 100% of the Addis Ababa road construction project suffered both time and cost overruns. The rate of time overrun ranges from a minimum of 4.11% to a maximum of 4.11% to a maximum of 135.06% of the contract amount. Road projects require a huge amount of capital, but they contribute to the total economy by creating jobs and having a ripple effect on other business activities. The homogeneity in transportation departments is the failure to finish the projects on time and within the estimated budget. Therefore, the aim of the study is to assess the problems that lead to time extensions and cost overruns and to avoid or minimize the EOT and cost overruns of the road project in Addis Ababa.

1.2 Statement of problem

Ethiopia is a developing country where its construction sector is affected by cost and time overruns. Road projects in Ethiopia are victims of this problem. One of the problems is the extension of time, which affects the cost overrun of the project. Mostly occurs during this, leading to variation in order and negative impacts on the performance of the project concerning cost, time, and quality, resulting in cost and time overruns, quality degradation, loss of productivity, the total cost of the project, unemployment, the liquidation of construction firms, disputes, and litigation. On a construction project. Due to this reason, I went to assess the problem, and it was selected by three contractors from Koye Fitche to take a sample population from both the client and consultant sides. This study is intended to address how extensions of time affect the cost overrun of the project. Solve two problems, which are cost overruns and time extensions important for the economy of our country.

1.3 Research Questions

1. What are major cause of extension of time on three contractors?
2. What are the cause of cost run on the road project?
3. How can extension of time can have impact on cost overrun of the road project?
4. What is the relationship between extension of time and cost overrun on those contactors road project?
5. How the extension of time and cost overrun could can be avoided or minimized (mitigation method)?

1.4 Objective of Study

1.4.1 General objectives

The general objective of this study is to examine the effect of extension of time on Cost overrun of road project in Addis Ababa.

1.4.2 Specific objective

- To identify the cause of extension of time on the road project
- To examine the major cause of cost overrun on the road project
- To identify how extension of time affect cost overrun in Addis Ababa Road construction Projects
- To measure the relationship between extension of time and cost overrun of Addis Ababa Road Construction Project.
- To Develop possible solutions in order to minimize delays and cost overrun in road construction projects in Addis Ababa.

1.5 Scope of study

Due to time and cost limitation,scope of this research was limited to investigated the effect of time extension on cost overrun incase of selected road project in Addis Ababa, on koye fetch site only which is found in the southern part of Addis Ababa three project (project 11,16 and 18) in the koye Feche site where covered under this study.

1.6 Limitation of study

Since the study is limited to one road construction service provider in Addis Ababa,. Therefore, it may impede the generalization of the results obtained from this study. Also, time and financial constraints would be factors in limiting the sample size to a manageable level.

1.7 Significance of study

The study could benefit as to show impact extend our time it affect the cost of the road project that establish to what extent time overruns contributes to cost overruns . Construction time and delay have been a major concern for all stakeholders in the construction industry. It will contribute to the improvement of construction variation order management and help minimize the adverse impact of variation orders on a construction project. This study will help the Addis Ababa City Road Authority and the Federal Ethiopian Road Authority in assessing and taking remedial measures to reduce the impact of variation orders. try around the world, and there has been study of the extension of time on the project. The extension of time and the cost overrun are closely related. The study contributes to accomplishing any project at the right time and cost, which means it is important for the is important for the economy of our country, and nowadays most projects are not done because of budget insufficiency.

1.8 Organization of this paper

The document is organized into five sections. Chapter one provides the introductory part of the study, which encompasses the background of the study, the statement of the research problem, the objective of the study, the research question, the significance of the study, the scope of the study, and the organization of the research. Chapter two presents a literature review, including the theoretical review, empirical reviews, conceptual frame work, resolution for minimizing schedule delays and cost overruns, conceptual frame work, conclusion and research gap, and summary of the literature review. The third chapter will cover research design and methodology. Chapter Four will present the data analysis and discussion, and Chapter Five will present the conclusion and recommendation.

CHAPTER TWO
Review of Related literature

2.1Introduction

As mentioned earlier,this study is on the perceived effects of time extension on cost overruns in road projects in Addis Ababa. To answer the research questions, it is necessary to find out the necessary theoretical and empirical previous studies on the problem. Therefore, it is necessary to provide theoretical information about project time extension and related concepts first. The purpose of this chapter is to provide the required theories to understand the extension of time in construction projects. This project answers the following the following questions:

- What is extension of time?
- What is the cause of extension of time?
- What are the relationship between the extension of time and cost overrun for road project?
- What are factor influencing timely completion of construction project?

Information provided in this chapter will give the reader an understanding of extension of time and cause of extension of time.in this following a definition about extension of time ,cause and effects will be provided and possible measures to minimize the problem will discuss in detail.

2.2 Extension of time Definition

An "extension of time" is a circumstance in which a contractor asks for more time than was initially agreed upon to finish a road job. Time overruns, or delays in finishing a project, can result in disagreements, cost overruns, and even project termination. There are several stakeholders in a contract who may create delays in construction, and there is a direct relationship between cost overruns and time extensions. The construction duration is the amount of time specified by the customer to finish a project under typical working conditions; nevertheless, time overruns frequently need the activation of contractual remedies, such as time extensions. Research carried out in Sarawak concentrated on the causes of project delays and the issuance of extensions of Contractors often seek extensions of time to avoid penalties and liquidated damages and gain additional time to complete projects. Construction projects frequently have delays, which can be caused by

unanticipated events or an increase in workload within a predetermined timeframe. Road construction projects in Addis Ababa, Ethiopia, are often beset by delays. The purpose of this study is to determine the typical reasons that lead to delays in asphalt road construction projects. A questionnaire survey is used in the study to gather information about the reasons behind time overruns.

Extension of time overrun was treated as the time difference between the actual and the initially planned (expected) dates of completion. The original completion dates for individual projects as well as. The actual completion dates were extracted from the respective project completion reports. The difference between the two dates is the time overrun, and the percentage ratio of this difference to the original contract duration was used to define the time overrun rate. In order to extract the overrun caused by inadequate design, a careful study of the analysis done by the project supervising consultants on granting the time extension requested by the contractor was done. The key documents on this matter were the contractor's letters requesting an extension as well as the consultant's letters granting the extension. Normally, the contractor's letters included every reason for requesting an extension and the number of days for each individual problem. The consultant could either grant the whole requested time, reduce it, or reject it, and in any case, the reason(s) were stated in the letters. By reading these letters, problems associated with inadequate design could be separated from others. Therefore, out of the total overrun duration, the extension time granted as a result of design problems was separated from others and used to determine the overrun rate due to inadequate design (Eradius et al 2013).

2.3 Cause of Extension of time

There are several reasons why time can be extended, and project delays are one of them. Ahmed et al. (2003) define delays in a construction project as the difference between the actual and contracted completion dates of the job. As he said, delays are widely recognized as the most frequent, expensive, complicated, and dangerous issue that arises in road projects. It is the source of frequent conflicts and lawsuits that lead to claims since time and money are so important to both the contractor and the owner (client) in terms of performance and money. Every construction project has delays, and the amount of these

delays varies greatly from one project to the next. While some projects are over a year behind schedule, others are only a few days late. Therefore, in order to reduce and eliminate delay in any construction project, it is imperative to identify the true sources of delay. According to that research, there are numerous reasons why time is extended, such as project delays, issues with design, management, contractors, resource allocation, government agencies, material shortages, and a lack of dedication.

2.3.1 Delays of project

Owner-related variables that contribute to delays include sluggish decision-making and change orders. There are numerous reasons why delays occur as well as different kinds of delays.(Ahmed et al,2003)

2.3.1.1 Causes of Delay

Researchers have studied the causes of delay and have tried to identify the root factors that cause delay on different kinds of projects in the construction industry (road, building, railway, and hydro projects). Even though such projects could differ by their nature and scope, the results of almost all the studies have shown that the so-called root factors are common to all kinds of projects. There are two kinds of causes for delays in construction projects.

Internal Causes: Such causes include those arising from one or many of the parties involved in the project.

External causes: These are causes that do not arise from the four parties and are based on some external factors like government, materials, suppliers, or weather. (Ahemed et al., 2003).

Many factors have contributed to delays on construction projects to date. These range from factors inherent in the technology and its management to those resulting from the physical, social, and financial environment.

Ogunlana et al. (1996) studied the delays in building projects in Thailand as an example of developing economies. They concluded that the problems of the construction industry in developing economies could be nested in three layers: problems of shortages or inadequacies in industry infrastructure and supply of resources; problems caused by clients and consultants; and problems caused by the incompetence of contractors. They have

classified the sources and causes of delays into six groups:

- Owner-related factors include change orders and slow decision-making;
- Designer-related factors include incomplete drawings and low response;
- CM or inspector-related factors include deficiencies in organization, deficiencies in coordination, and an uncompromising attitude. Contractor-related factors include materials management problems, deficiencies in organization, coordination deficiencies, planning and scheduling problems, equipment allocation problems, financial difficulties, and the inadequacy of site inspection.

Resources supplier-related factors include shortage of construction materials, late delivery, price escalation, low quality of materials, shortage of site workers, and shortage of technical personnel, insufficient numbers of equipment, and frequent equipment breakdown; and Others factors include confined site, problems with neighbors, and slow permits by Government agencies.

2.3.2 Design Problem

Designer-related problems include insufficient drawings and slow reaction; faulty design adds to both time and expense overruns, and its causes are poorly understood. The goal of this research is to discover the degree of the impact of deficient design, its causes, and corrective actions. Tanzanian road building projects are notorious for running late and costing more than they should. Inadequate design is one of the most prevalent issues identified in practically all projects. However, the magnitude and causes of these phenomena have received little attention. Unfortunately, delays in project execution cause individuals (road users) and the economy to wait for the road for longer than required, limiting the economy's overall development potential. On the Road projects, on the other hand, provide services that feed into many other areas of the economy. As a result, cost overruns boost the overall economy's capital-output ratio. Combining these two secondary problems: delays and cost overruns, the outcome is a decrease in the efficiency of the available resources and a limited growth potential of the overall economy.

Road design is one of several stages in the highway development process. Historically, design has always taken place in the center of the process, connecting the previous phases of planning and project development to the future phases of right-of-way acquisition, building and maintenance. This period includes a variety of activities that varies between

countries. However, the studied records demonstrated that the main efforts were feasibility research, preliminary design, and full engineering design. The sub-activities within the major activities are as follows.

Feasibility studies and preliminary designs entail analyzing potential fixes for issues and making recommendations regarding which one is best to use. It is carried out to help decision-makers decide whether to move forward with a specific project or not. A feasibility study for a road project, according to Arnitis et al., should identify the socioeconomic requirements for carrying out a particular project, the most advantageous alignment, the best possible structure, engineering solutions, and the means of putting those ideas into practice. The analysis includes a wealth of information about the financial and operational impact, as well as the benefits and drawbacks of the current state of affairs and the suggested course of action.

Detailed Engineering Design: This is going over the several designs that were put out in the preliminary design and choosing the best one to use as the foundation for the detailed design. The design tasks completed during preliminary design are now redone with greater detail. This is achieved by establishing the road's final, permanent centerline while also obtaining the extra physical information required to create the construction plan. Once a thorough design draft is submitted, it is reviewed by a group of experts from various fields, and concurrently, a road safety audit is conducted. The design consultant (or design team, if the work was done on a design review or road safety audit) receives feedback from the teams.

2.3.3 Management Problem

Deficits in organization, coordination, and uncompromising attitude are among the CM or inspector-related aspects that contribute to management problems, as previously noted in research.Problems with management include lead time extension, poor management, and the ability to complete tasks efficiently without committing them to a specific activity.

2.3.4 Contractor problem

Contractor related factors include materials management problem, deficiencies in organization, coordination deficiencies, planning and scheduling problems, equipment allocation problems, financial difficulties, and inadequacy of site inspection

2.3.5 Resource Allocation

The scarcity of building materials, delayed delivery, rising prices, low-quality supplies, lack of site workers, lack of technical personnel, inadequate equipment, and frequent equipment failure are all factors related to the resources supplier.

2.3.6 Government Agencies

Other factors include the restricted site, neighbor disputes, and government agency permit delays. said that failure to select the suitable contractor and incorrect calculations were the main causes of project delays.

- Poor design, unreasonably high contract period estimates, inexperience, delayed equipment and material delivery, labor relations in management, fluctuating material prices, financial hardships, and a shortage of materials are some of the major causes of construction project delays.
- The main reasons for delays include poor contract management, design modifications, contractor during construction, and payment delays.

2.3.7 Lack of commitment

Absence of dedication, unclear project scope and communication, ineffective site management, inadequate planning, ineffective site coordination, and subpar contracts. bad design that will be destroyed and then recreated again**.**

2.3 Factors influencing the timely completion of construction projects

➢ One of the most important requirements for any construction project's success is its timely completion. A project should be well planned at the outset in order to be completed within the allotted time frame.

- The primary stakeholders in a construction project are the client, contractor, and consultant.

- The client will suffer a loss of money since the project might not be feasible to complete. A delayed project means that the contractors will also need to complete it more quickly than they had anticipated. It also means that the contractors will have to pay for labor, materials, and equipment for a longer period of time, which will put them in financial straits and reduce their ability to secure new construction projects.

- The method of procurement is the project that should be duly completed within the specified project duration.

- There are a number of ways in which external stakeholders, including the government, regulatory agencies, the general public, etc., might cause problems with the project's completion.

- Throughout the project's lifecycle, the project's major stakeholders should carefully plan, schedule, and oversee each phase and major activity.

- If a building project is delayed, it will also negatively impact the aforementioned parties.

- The project may not be able to be completed in time for the client to receive payment. If the project takes longer than expected to complete, then the contractors will also need more time.

2.4 Empirical Concept

2.4.1 Concept of Cost overrun

Cost overruns are predominant in the sector as opposed to underruns. In the wake of shrinking government revenues, common sense tells us that spending needs to be curbed. Overruns will imply the waste of resources that otherwise would have been used for productive purposes elsewhere.

A highly problematic situation occurs when the cost of a project is underestimated and presented to decision-makers. Given that the decision-maker, in evaluating the viability of projects, may consider the net present value of projects (i.e., the difference between the net benefits and the net cost of carrying out the project), underestimated costs may be deceptive. In this case, the net present value may be so large that, had the actual viability of a project been known, the decision-makers may have resolved to choose one of the following three alternatives (source;internet)

1.Not to implement the project at all,

2.To implement the project in another form, or

3.To implement another project

The end result may be that nonviable projects are being implemented due to inaccurate estimates. This would lead to an inefficient allocation of resources. Thus, cost estimates presented to decision-makers should be scrutinized. Ideally, ex post studies should be conducted seeking to explain the divergence between estimated costs and actual costs. The results should contribute to the improvement of cost estimation.(source:internet)

The subject matter of this paper is to contribute to the debate on the magnitude of cost overruns and eventually reveal their causes in the Norwegian road sector. To do this, we investigate the statistical relationship between estimated and actual costs using data from Norwegian counties for the years 1992–1995. We build an econometric model, which we estimate to reveal factors that may help explain the observed overruns. This yields several benefits. We can control a host of factors, such as regions, time factors (estimated construction time and delay in completion time), the type of project (tunnels and bridges), and estimated construction costs. Thus, the following questions are addressed:

.(source:internet)

1.The magnitude and direction of a bias in cost

2.The relationship between cost overruns and other factors such as completion time, the size of the estimated cost, and the regions where projects are situated.

Some caution is, however, necessary with respect to the results that may be derived from this study. First, the projects that we examine are those that were carried out by the Norwegian Public Roads Administration (NPRA), not through a bidding process, and involve about 40% of the total budget for road projects. This may seem unrepresentative. However, 40% is still large enough to pinpoint the magnitude of overruns. Besides, it represents 100% of those projects carried out by the NPRA in the period considered and, therefore, at least will reveal the magnitude of overruns among the NPRAs projects. How these perform in relation to other projects not included is hard to tell; we have no reason to suspect any particular bias. In addition, one particular reason for selecting only the NPRA projects is that they are the ones with accessible data. Projects carried out through bidding processes by the private sector are not readily accessible in detail due to company confidentiality.

2.4.2 Effect of cost overrun

Cost overrun is generally expressed as the difference between the final cost of the project and the contract award amount. In most of the literature reviewed, the major causes of cost overrun are additional works and the related preliminaries including increase in cost of insurance as a result of increased works, changes in original design and/or scope, claims due to cost escalations and interest on delayed payments. On reviewing documents used in this study (project completion reports and project files), the same causes were found.in analyzing the cost overrun due to inadequate design, any excess amount due to change in design while keeping the scope intact, addition of omitted works, inaccurate estimates of quantities and their cost related preliminaries was considered as overrun due to inadequate design. However, cost escalation, which is also part of the estimate, was not considered as part of poor estimates because of its unpredictability as some of its driving factors may change while construction is in progress. Effect of Inadequate Design on Cost and Time

Overrun of Road Construction Projects in Tanzania (Eradius et al,2013).

However, as stated that one would argue that some of the payments might be delayed while the client is struggling to look for extra money for additional works in which if there was no additional works the delay would not have happened. By virtue of this argument, it is true that some of the claims due to delayed payments may have their root causes related to inadequate design and therefore not clients‟ faulty. However, due to the difficulty in separating the two scenarios, anything related to interest has been treated as client's faulty(Eradius et al,2013).

The percentage difference between the original and actual costs of different projects were determined and used to calculate their respective cost overrun rate. In order to determine the overrun rate emanating from design, the ratio of cost overrun due to inadequate design to the original contract price was used. Consultant's letters to the client informing him of the needs for extra funds and the reasons were the good sources of information used to separate causes of cost overrun due to inadequate design from others(Eradius et al,2013).

2.4.3 Cause of cost overrun

Impacts are the outcomes that will be empowered when cost overrun happen on a construction project. Nega (2008) states that cost overrun have clear impacts for the key partners specifically, and on the construction business as arule. To the client, cost overrun infers included expenses far beyond those at first settled upon at the beginning, bringing about less degrees of profitability. To the end client, the additional expenses are passed on as higher rental or rent expenses or costs. To the experts, cost overrun infers powerlessness to convey an incentive for cash and could well stain their notorieties and result in loss of certainty rested in them by customers. To the contractor, it suggests loss of benefit for non-fruition, and maligning that could risk their odds of winning further occupations, if to blame. To the business all in all, cost overrun could realize project surrender and a drop in building activities, bad reputation, and failure to making sure about it at greater costs due to added dangers. To the business as a whole, cost overwhelms could achieve project relinquishment and a drop in building activities, awful standing, and failure to making sure about it at greater expenses due to added risks.

The investigation of Nega.T (2008) further recognized the accompanying as the significant impacts of cost overruns as: delays during construction, supplementary agreement, discourage investment; the investment on project construction by public clients will be less, hence the number of projects will decrease in the future, additional cost/expense, Budget shortfall adversarial relationship between participants of the project, Loss of reputation to the consultant, Loss of profit for non-completion to the contractor; the consultant will be viewed as incompetent by project owners, Significant experience of oversight and agreement with organization for consultants, Delayed installments to contractors, The contractor will suffer from budget shortfall of the client; Loss of users benefit that will be obtained if it has been completed on time . The contractor will suffer from budget shortfall of the client and poor quality workmanship.

2.4.3.1 Variation order in construction project

It is a formal written agreement between the construction parties that specifies any additional work, deletions, or revisions to the agreement documents, indicates changes to the cost and schedule, and explains the nature of the work to be done. Change orders rise as sources are changed, sometimes for foreseeable reasons and sometimes for unanticipated ones. A business arrangement that is subject to change is a construction contract. Contractual teams participating in the tender can readily advocate change orders within the impact of the job scope without changing the initial contract thanks to contractual articles pertaining to variations.

Change orders entail adding to, subtracting from, changing, and replacing work in terms of quantity, quality, and timeliness. In the absence of contractual clauses, the licensed building contractors need have to decide to upright the building as per the design and represented in the agreement forms. In the event that an owner disagrees to an unrestricted price escalation clause, consider including a contingency budget in the contract for price escalations. Price escalation clauses are potentially important to every trade. In the recent past we have seen significant price escalations occurring with concrete, steel, &fuel to name few. The source of these price escalations are not going to go away. Make sure you have explored the possibilities of a price escalations begin clause while your contract. The

purpose of an escalation clause is to cope with and provide some insurance for inflation in long- term sales and purchase contracts.

2.4.3.2 Price escalation

A price escalation clause gives the involved parties the chance to prepare for unforeseen circumstances and choose how and to what degree the increased expenses will be covered. Material shortages are another problem that frequently coexists with price increases (i.e., supply and demand). A companion clause allowing for time extensions in the event of a material shortage should be included in the contract. Although many contracts permit extensions of time for unforeseen events that result in delays, material shortages may be predictable in certain situations. Consider making arrangements for the upfront purchase of supplies, the use of a bonded warehouse, and the owner's payment for materials kept in the bonded warehouse if the owner is unable or unwilling to accept a price escalation clause. Delay Projects or construction works that are not delivered on time to the client are referenced to as projects that have undergone schedule delays. Hence, Mohammaed (2010) defines schedule delays or overruns as an act or event that extends the time to complete or perform an act under the contract. Also, Assaf and Al-Hejji (2006) explained schedule delays as the time overrun, or beyond the date that the parties agreed upon for delivery of a project. It is essentially a project slipping over its planned schedule and is considered as regular issue in construction projects around the world. They also pointed out that, the client, schedule delay means loss of revenue through the lack of production facilities and rentable space or a dependence on prevents facilities. Sometimes; for the contractor, schedule delay means higher material costs through inflation, and due to labour cost increases. According to Alkhathami (2004) clarifies that schedule delays can be characterize as additional time required to complete a given construction project beyond its original planned duration if compensated for or not.

Researches in creating nations particularly Africa have gained ground progress in deciding the causes behind project delays and cost overruns. As cited by Kaliba, Muya, and Mumba (2009) clarify in their examination that, the significant reasons for delay in road construction projects in Zambia were delayed payments, money related insufficiencies

with respect to client helpless coordination on location, changes in determinations, work questions and strikes. In Uganda, Agaba (2009) properties delays in construction projects to poor plans and details. In their study, El- Razak, Bassioni, Mobarak, (2008) found that delayed payments, coordination trouble, and poor correspondence were significant reasons for delay in Egypt. Studies outside the African mainland appear to have indistinguishable practically comparable causes. Sambasivan and Soon (2007), and Alinaitwe (2008) set up that lack of common sense, poor site management, insufficient to administrative abilities of the contractor, delayed payments, material deficiency, work gracefully, hardware accessibility and failure, poor communication and rework were the most significant reasons for delays in the Malaysian construction industry. Kouskili and Kartan (2004) distinguished the fundamental elements influencing cost and time overrun as lacking/wasteful gear, instruments and plant, problematic wellsprings of materials on the nearby market, and site mishaps. Subsequently, the rundown of causes affirm above concur with the findings of AbaMajid and McCaffer (1998) who presumed that on the off chance that such causes are viably managed; at that point schedule delay can successfully be alleviated or managed.Generally, we can understand that if any alteration or adjustment is made to any of the two variables then it in turn will affect the other one. Thus one can say a project with a delayed schedule will require additional money and resources to deliver the project.

2.4.3.3 Project Delay

In a construction project, delay is the result of unexpected act or event that extents required time to complete the tasks under contract or beyond the date agreed by parties to deliver the project (Ramanathan et al., 2012). Delay can be either extra days of work for an activity or late start of an activity (Yang, Chu and Huang 2013). Projects comprise of collections of activities and delays can be measured at the activity or project level. On the activity level, delays can affect completion of activities, which may or may not have an impact on succeeding activities. At the project level, analysis typically focuses on delays relative to project completion (Gonzalez et al,2014).

Delay in construction is a state in which the actual progress of the phases of a construction project becomes slower than as planned or completing the project late (Chartered Industry of Building [CIOB], 2008). Delay in the setting of construction refers to prolonged period of construction and interruptions of events that distracts the programme of the construction. Cheung, Shu and Arditi (2001) states that delay is acknowledged as the common, and complex problem encountered during projects. Delays are synonymous with construction projects. Delay has been established as one of the commonest experience in the construction project globally (Ahmed et al.,2003). Multiple studies have identified incident of delay as a major problem facing construction projects in the world (Kaliba et al, 2009). However, delays are not only experienced in the emerging and developing countries only, delays are a global phenomenon (Memon et al, 2011).

2.4.3.4 Price Fluctuation

Price fluctuation can generally be defined as the rise or fall of price of goods, materials and services on the markets. Price fluctuation can occur at any market, i.e at international markets, local market and/or at the labor market. The reasons for fluctuation are several, the major ones being [Stukhart 1982]: Government's regulation on oil price, shortage or excess supply at market and increase or decrease in demand of a certain item.

Government's regulation on oil price: the price of oil governs the cost of materials since oil is related to production or transport of materials. When the government changes the price of oil, the price of materials also changes accordingly.

Shortage or excess supply at market: the availability of certain item on market has an inverse relationship with the price of the same on the market. If an item is supplied in excess amount on the market, its price will reduce from its normal price, and inversely, if there is a shortage of the same item, then its price will rise. Increase or decrease in demand of a certain item: the price of a certain item has a direct relationship with the demand of that particular item. If the demand for certain item rises, then its price will also rise and vice versa.

2.5 Conclusion and Knowledge Gaps

There are many studies about Effect of extension of time on cost overrun incase selected contractor in Addis Ababa in road construction projects. However there are few studies on effect of Eot on cost overrun in road construction in developing countries such as Ethiopia specifically in Addis Ababa City. Researchers investigated different factors that cause of Eot in road construction, its effect on cost overrun from project initiation up to project close out. When considering Eot in context of public road construction projects there are main factors that delay of project from different perspective. This research tends to address this issue and add a fresh contribution to the scant literature that deals specifically with this question.

The review of literature found few research studies related to the analysis of Eot factors in the Ethiopian road construction industry. However, it was also found that no studies to date have ranked the effects of Eot in Addis Ababa city road construction projects and its effects on cost of project. In addition, there were few studies carried out in relation to stakeholders and studies few limitation on three contractor. Other limitation is studies only in the Addis Ababa city only. Hence conducting study on causes of Eot on road projects from limited stakeholders‟ side will not give complete solution to the problem.

2.6 Conceptual Framework

The central aim of this study is to look at the effect of extension of time on cost overrun Melcon,ECWC, Melcon Contractors . Based on the objective of the study, the following conceptual model is framed from the empirical and theoretical literature review. In this conceptual framework; cost overrun is used as a dependent variable and Extension of time are independent variables.

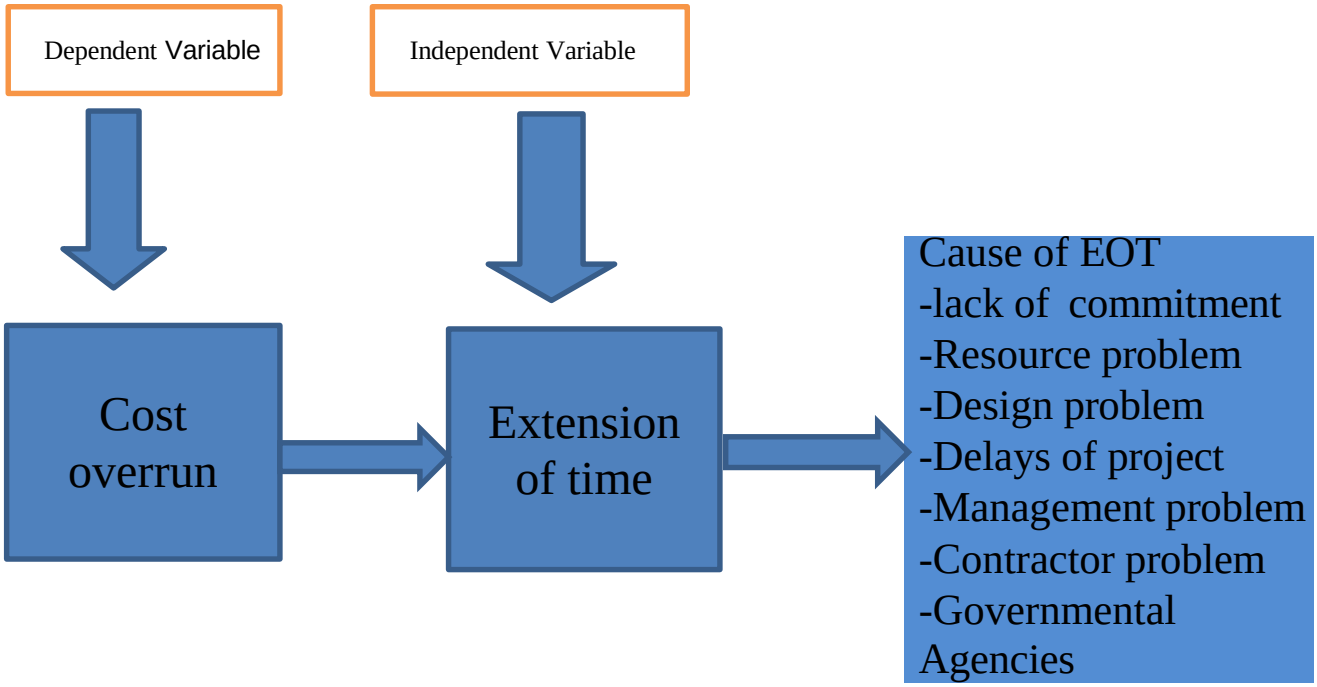

Fig 1.1 Conceptual Frame Work

(Source: own survey 2024)

2.7 Summary of literature Review

Table 1.1 Summary of Literature Review

Summary Literature review	
Theoretical Review	**Empirical Review**
1.Extension of time definition	1.Definition of cost overrun
2.Postive effect of Extension of time	2.importance of cost overrun
3.Negative effect of Extension of time	3.types of cost overrun method
4.cause of Extension of time -delays of project -design problem -management problem -contractor problem -resource allocation -government agencies -lack of commitment -material related delays	4.factor influencing cost overrun 5.construction cost overrun Module 6.cause of cost estimation Module -variation order in construction project -price escalation -Schedule delays -project delays
5.factor influencing The timely completion of construction project	

(Source: own survey 2024)

CHAPTER THREE
METHODOLOGY OF THE STUDY

3.1 Study Area

This study's focus was on road construction projects that AACRA was currently working on at IFH,Melcon, and ECWC, which were the three contractors that I had chosen. With the use of secondary and primary data, the study's respondents managing, supervisory, professional, and semi-professional employees of IFH,Melcon, and ECWC—engaged in road construction projects at Addis Ababa City Roads Authority and had less than a year's experience. Employees of AACRA who participated in the building of asphalt road construction projects taken (considered) for the study make up the study's population. It looks for potential explanations for time extensions in road construction projects. All of the sample respondents who were previously chosen received the survey questionnaires.

3.2.Research Design

Research on the practical issue of time and cost overruns was conducted using data from construction project observations. The purpose of the research questions was to evaluate the reasons for time extensions and expense overruns in projects. The study falls into one of three categories: exploratory, descriptive, or correlational. Because the research is exploratory in nature, it begins with realistic (practical) issues and looks into the possibility of finding the causes of time and expense overruns. Additionally, it aims to create a connection between the contract document and the rate of time and cost overruns in Melcon, IFH, and ECWC. This makes it descriptive as well as attempting to explain the variables that contribute to time and cost overruns.

3.3 Source of data

The study's sources of data were both primary and secondary data about the topic that the study is trying to cover. Data collection is the method of gathering data on a specific variable. There are two types of data sources: primary and secondary. Primary data are those collected for the first time and thus original. Secondary data are those that have been collected and passed through a statistical' process by someone else. Observation, interviews, questionnaires, and focus group discussions were some of the primary data collection methods used in the survey and descriptive research. Secondary data can be published or unpublished and can include technical and trade journals. Books, magazines, newspapers, reports, and publications of various business and industry associations; reports prepared by researchers, scholars, universities, economists, and others in various fields; public records, statistics, and historical documents.

Both primary and secondary data sources were to be used in this study. The primary data was collected from the project participation (employees) under the three organizations: the client/employees, employees, the contractor, and the consultant, through a structural questionnaire and interview. The secondary data was collected from contract documents, project documents, articles, journals, and academic research conducted in the area.

3.3.1. Primary source

The primary source of data was obtained through questionnaire results. The sources of data were from the main parties in the construction projects, namely the consultant side (general manager, resident engineer, office engineer, and others).

3.3.2. Secondary source

Secondary data were collected from secondary sources of data such as books, journals, reports, and related articles from the internet. These secondary data would then be used to prepare questionnaires about the topic under discussion. Closed-ended questionnaires would be prepared and distributed to all selected respondents.

3.4. Sample Design

3.4.1 Sample population

The target populations of this study were employees of IFH, ECWC, and Melcon Engineers Consulting P.L.C., including the management and supervisors of the company in various departments with less than one year of experience. It was selecting three contractors, which are IFH, ECWC, and Melcon Construction PLC, at the Koye Fitche site. They undertake projects with huge budgets, and those contractors are the higher-class contractors. Therefore, as mentioned in the research, the study populations included for this research work are general contractors of class 1 and availability of sites. Those contractors are well-known for the size of their projects and the high number of employees they have under their organizations. One of the consultants is IFH Engineering PLC (formerly named CRBC Addis Engineering Plc), a locally registered foreign company that has obtained investment registration from the Ethiopian Investment Commission to perform general construction work on a capacity of GC-1 contractor. IFH Engineering PLC is well equipped with state-of-the-art surveying, laboratory, and design equipment and has an adequate number of highly skilled engineers, technicians, operators, and different laborers to properly run the company. The other contractor, Melcon Construction, consists of dedicated professionals with extensive knowledge and experience in road projects. The companies currently have three ongoing and 11 completed projects in which Melcon Construction has been engaged. The various fields of expertise of roads, structures, railways, airfield investigations, and construction.

The employees have rich and pervasive experiences in Moreover, non-permanent employees are excluded from this study. The study would be conducted excluding permanent employees who have worked for more than one year because they help minimize the sampling group in terms of time and resource constraints. By considering the above points, the study would be conducted at both the head office and sites located in A/A, which will be chosen from among other sites and offices.

3.4.2 Sample size determination

The questionnaire was carefully designed to get a high response rate from respondents. To determine the sample size and representativeness of the target population, the study used a statistical instrument formula. I took 80 people from contractors with less than one year of experience and management staff from the three contractors. The mathematical formula is adopted from Gliem (2003).

$$n = N/1 + N(e)2$$

The study assumes that the margin of error is 5% and confidence level or error-free of 95%. Using the above portrayed statistical formula, the sample size of the study it would be determined as follows.

$$n = 80/1+80(0.05)2=66$$

n= sample size N= population e= error margin

Therefore, take 66 permanent employees of the three contactor populations in the study. The total population would be 66 for the three contractors, and using random sampling, 17 for the client side and 17 for the consultant side would make free distribution among the stakeholders. The total number of employees from three contractors, including the consultant side and the client side as well, is 100.

3.4.3 Sampling Technique

The data collection part of the research is the most tiresome part; the most difficult one is the respondents' reluctance to react as per their promised schedule. The time schedule that was allocated to the research and respondents reluctance not to respond quickly made the research stressful for the period of data collection and use of primary and secondary. For the primary data collection from managerial staff, the three contractors are IFH, ECWC, and Melcon Construction, and secondary one-year experience among IFH, ECWC, and Melcon Construction was used using random sampling techniques.

3.5 Data collection methodology

Document review: Secondary data about road construction projects such as books, journals, internet sources, archival documents, are reviewed to understand the background of productive management of employees in the construction sector. These secondary sources provided a general understanding of the subject area by presenting a wide range of ideas in the field which helped to supplement other specific information obtained from the primary data sources.

Questionnaire: Secondary data are used to prepare questionnaires concerning the topic under discussion. Closed-ended questionnaires will be prepared and distributed to all selected respondents.

3.6. Data analysis methods

The best appropriate method to gather primary data is to hand out the questionnaire. A five-point Likert scale questionnaire will be established to assess the participants' comfort in replying to the questions according to their degree of agreement (McLeod, 2008). The Likert scale follows the format of the starting range: 1 “strongly disagree”; 2 “disagree” 3 “neutral” 4 “agree" and 5 “strongly agree." The questionnaire will be created with the following variables in mind: Extension of time, cost overrun.

3.7 Validity and reliability

3.7.1 Validity

Validity of measurement is a critical criterion that indicates if a measuring instrument is measuring what it is supposed to measure. To minimize problems related to validity, the questionnaire will be carefully designed so that it includes all the topics covered by the study.

3.7.2 Reliability

Reliability is concerned with the consistency of results obtained by a measuring instrument. To ensure reliability in this study the questionnaire adopted is compared with prior conducted studies and external factors such as fatigue and boredom will be minimized to the possible extent.

3.8 Ethical Consideration

Ethical considerations must be considered while doing research. The first thing that we have to do is that participants need to be aware of the purpose of the research and fully informed about the evaluation being conducted, and researchers should not forcefully influence the decisions of the respondents. In addition to this, the collected data from participants should not identify their names or other information, and the documents must be used for study purposes. Lastly, but not least, is truth-telling, whereby the researcher is required to provide comprehensive and accurate information in a manner that enhances understanding.

CHAPTER FOUR

RESULT AND DISCUSSION

4.1 Socioeconomic Description and Response rate of respondent

4.1.1 Socioeconomic Description

This part of the research deals with the analysis and discussion of the data gathered from the desk study and questionnaire survey. It includes the identification of the existence and extent of extension of time, main causes of extension of time, rate of occurrences of variables of extension of time, and the effect of the extension of time on the final/total cost of the project. Finally, the effects of extension of time on the various stakeholders, on the construction industry, and on the national economy in general will be dealt.

4.1.2 Questionnaire Response Rate

Detailed questionnaires were designed and distributed for the assessment of effects of extension of time on cost overrun construction projects in Ethiopia, for this purpose the questionnaires were distributed to major stakeholders in the construction industry; these are Contractors, Consultants and Clients (project owners). To make the analysis more comprehensive a total of 100 questionnaires were distributed to consultants, contractors and clients (project owners) out of which 76 questionnaires were filled and returned. Questionnaires distributed to clients, consultants and contractors and the number of questionnaires returned from these stakeholders including their percentage response rate.

Fig 4.1 Summary of Number and Percentage of Questionnaires Distributed and Returned

No.	Respondent	Questionnaire distributed		Questionnaire Returned		Response Rate
		No.	(%)	No.	(%)	(%)
1	Client	17	17%	16	21%	94%
2	Consultant	17	17%	16	21%	94%
3	Contractor	66	66%	42	55%	63.6%
	Total/average	100	100	76	100	76%

(Source: own survey 2024)

From the table above percentage of questionnaire distributed and questionnaire Returned concluded that

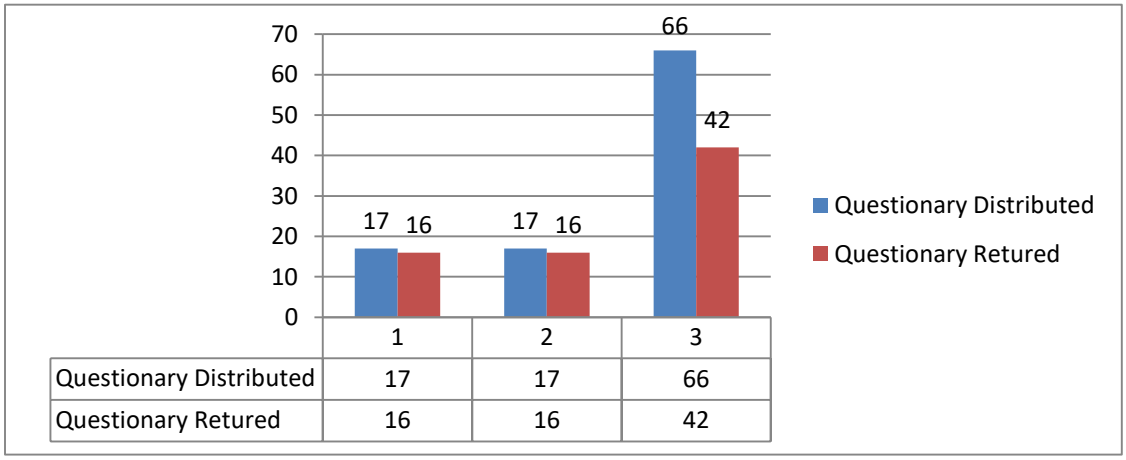

Figure 4.1 Distribution of Questionnaire

From graph we can concluded that from the 100 questionnaires were filled and returned are questionnaires distributed to clients are 17 were distributed from the total of 100 and 16 were returned, 17questionnaires distributed to consultants from that 16 were returned and questionnaires distributed to contractor were distributed to contractor that 66 from that the returned are 42% .In general we can conclude that from 100questionary were disturbed and

76 Questionnaires were returned.

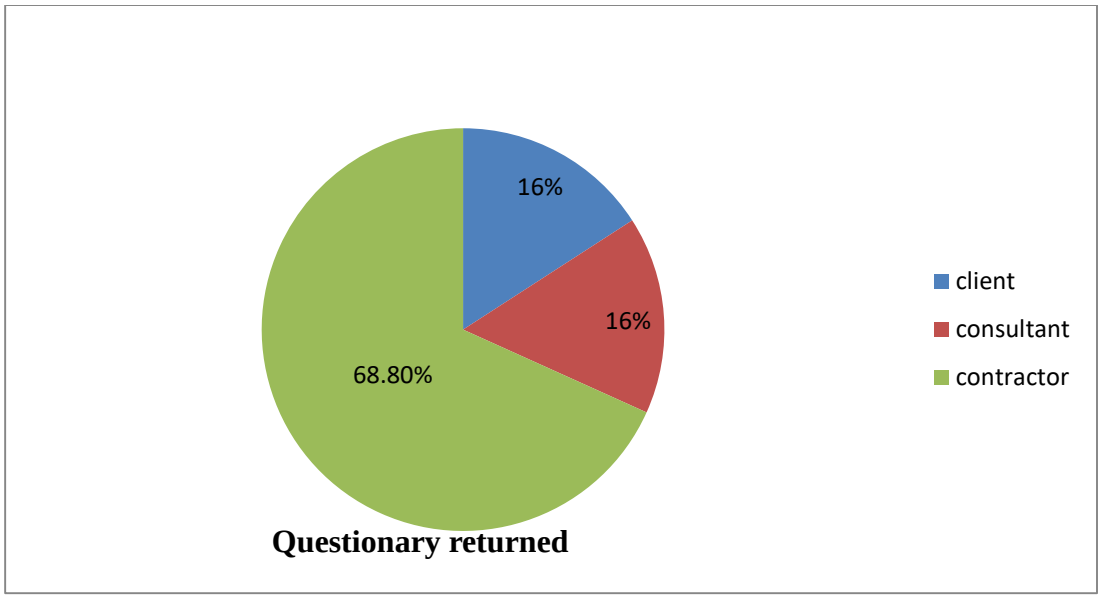

Fig 4.2 Bar Chart Questionnaires Returned

As shown from bar chart from 76 number returned from that 16% were client side, 16% were consultant side and remaining part become contractor side which is 68.8%.

4.2 Characteristics of data

According to the data collected from the respondents through questioners and the review of the latest report of the projects prepared by the consultants the profiles of the respondent, company and project is as follows.

4.2.1 Gender Composition:

- From 76 of the respondents the gender difference as shown in the bar chart and Table form. Out of the total returned questionares,58 of the respondent or 76.3% are male while the remaining 16 or 21.1% are female according to the assessment made on the gender distribution of the data collected.

Table 4.2 Respondent Gender Bar Chart

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Male	58	76.3	77.3	77.3
	Female	16	21.1	21.3	98.7
	5.00	1	1.3	1.3	100.0
	Total	75	98.7	100.0	
Missing	System	1	1.3		
Total		76	100.0		

(Source: Own Survey, 2024)

4.2.2 Respondents' Age:

Table 4.3 Respondent Age

Age of Respondent	Frequency	Percent
24-33	41	53.9
34-43	22	28.9
44-53	7	9.2
54-63	4	5.3
above 63	2	2.6
Total	76	100.0

(Source: own survey, 2024)

- Respondents were range of 24- 33 have 53.9%, respondents were range of 34- 43 have 28.9%, respondents were range of 44- 53 have 9.2%, respondents were range of 54- 63 have 5.3% and also above 63of them are 2.6%.

4.2.3 Respondents' Educational Background

- All respondents have at least a collage diploma are 3.9%and out of all 64.5% have undergraduate degree, 28.9% have postgraduate degree and the left 2.6% have collage diploma in civil engineering and related fields.

- Most of the respondents have an experience, which is minimum experience of 1 years' experience. Out of these, most of them are working at the contractor side and the other contractors at the client and consultant.

Table 4.4 Respondent education background

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Diploma	3	3.9	3.9	3.9
	BA/BSC	49	64.5	64.5	68.4
	MA/MSC	22	28.9	28.9	97.4
	PHD	2	2.6	2.6	100.0
	Total	76	100.0	100.0	

(Source: Own survey, 2024)

4.2.4 Type of organization or company

Table 4.5 Respondent type of organization or company

	Frequency	Percent	Valid Percent	Cumulative Percent
Client	16	21.1	21.1	21.1
Contractor	41	53.9	53.9	75.0
Consultant	19	25.0	25.0	100.0
Total	76	100.0	100.0	

(source: Own survey ,2024)

From 76 of the respondents the 21.11 are from client side, the other one is the 53.9% are from contractor side and the remaining 25% will be consultant.

Respondent Role/ position in the project work

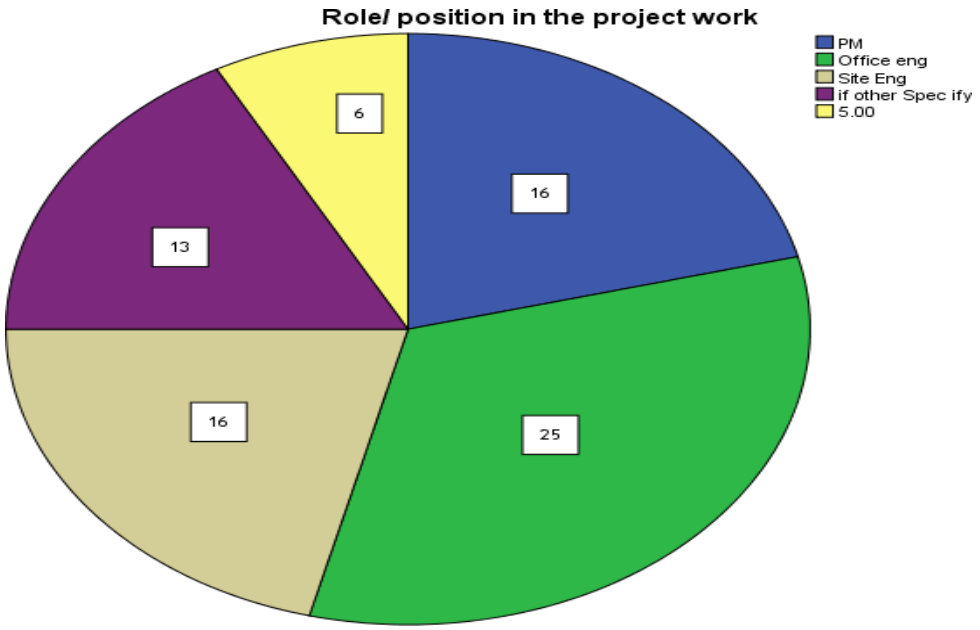

Fig 4.3 Respondent Position of the Project Work

From the respondent Project Manager have 20%, office engineer have 32%,site manager have 22.7% and the rest one is any other related construction workers have 25.30%.

4.3 Descriptive Analysis

A total of 76 linkert scale question were include in the questionnaire with the intension to access the insight of respondent on the effects of extension of time on cost overrun in case of selected road project in Addis Abeba. Respondent were requested to indicate their level of agreement on the statement provided on project progress tracking. A five point linkert scale was used in which 5-strongly Disagree,4-Disagree,3-Neutral,2-Agree and 1-Strongly Disagree.

This section presents the finding of descriptive analysis of the respondent's opinion towards the causes of extension and their effect on cost overrun. Descriptive statistics were used to evaluate and rank the most important causes and effects of a EOT and cost overrun. The RII method was adopted for this study to determine the relative importance of the various causes of EoT and its effect on time extension based on responses of the owner, contractors and consultants. The relative importance index (RII) ranges from 0-1. The five-point linkert scale ranged from 1-5 was transformed to relative importance index using the following equation.

$$RII = \frac{\sum w}{AN} = \frac{5n5 + 4n4 + 3n3 + 2n2 + 1n1}{5N}$$

Where: w is the weighting given to each factor by respondent ranging from 1t o 5 A is the highest weight meaning 5 in this case

N is the total of respondents

The descriptive statistics including the mean and standard deviation along with their ranks are presented. The entire frequency and percentage of factors contributing to extension of time and their effects on.

4.3.1 Statement on cause of extension of time

Table 4.6 Rank of cause of EOT

Item	Mean	Std Deva	RII	Rank
Delays of project whether inside of contractor related	4.25	0.9	0.608	1
Management problem	4.16	0.86	0.626	2
contractor problem	3.95	0.89	0.594	7
lack of resource	4.05	0.85	0.61	3
government agencies	3.96	0.86	0.602	5
lack of commitement	3.95	0.81	0.598	6
other external factors related problem	3.93	0.79	0.592	8
design related problem	3.99	0.77	0.608	4

(Source: own survey 2024)

Table 4.6 shows the means score based on the response of the participants with respect to the cause of extension of time.

1. Delays of project

Delays of project, the mean score is 4.25 which implies most of the respondents agree that delays of project is cause for extension of time of the road construction project.

2. Management problem

Management problem the mean score is 4.16 which implies most of the respondents agree that Management problem one of the cause for extension of time in the road construction project.

3. Contractor problem

Contractor problem the mean score is 3.95 which implies most of the respondents agree that Contractor problem one of the cause for extension of time in the road construction project.

4. Lack of resource

Lack of resource the mean score is 4.05 which implies most of the respondents agree that Lack of resource one of the cause for extension of time in the road construction project.

5.The government agencies.

The government agencies the mean score is 3.96 which implies most of the respondents agree that government agencies one of the cause for extension of time in the road construction project.

6. Lack of commitment

Lack of commitment the mean score is 3.95 which implies most of the respondents agree that one of the cause for extension of time is government agencies in the road construction project.

7. Other external factors related problem

Other external factors related problem the mean score is 3.93 which implies most of the respondents agree that Other external factors related problem one of the cause for extension of time in the road construction project.

8. Design related problem

Other external factors related problem the mean score is 3.99 which implies most of the respondents agree that Design related problem one of the cause for extension of time in the road construction project.

4.3.2 Respondent Statements on cause of cost overrun

Table 4.7 Rank of Cause of Cost Overrun

Item	Mean	Std. Deviation	RII	Rank
Design change	4.11	0.79	0.61	2
Low Acceleration of project	3.96	0.70	0.598	3
Quantity underestimation	3.86	0.76	0.58	6
Price escalation	4.09	0.88	0.622	1
Corruption among the stakeholder	3.89	0.81	0.596	4
Lack of quality	3.79	0.84	0.588	5

(Source: own survey 2024)

Table 4.7 shows the means score based on the response of the participants with respect to the cause of cost overrun.

1. Design Change

Design Change, the mean score is 4.11 which implies most of the respondents agree that Design Change is cause for cost overrun of the road construction project.

2. Low Acceleration of project

Low Acceleration of project, the mean score is 3.96 which implies most of the respondents agree that Low Acceleration of project is cause for cost overrun of the road construction project.

3. Quantity underestimation

Quantity underestimation, the mean score is 3.86 which implies most of the respondents agree that Quantity underestimation that is cause for cost overrun of the road construction project

4. Price escalation

Delays of project, the mean score is 4.09 which implies most of the respondents agree that Price escalation is cause cost overrun for of the road construction project. Corruption among the stakeholder, the mean score is 3.89 which implies most of the respondents agree that Corruption among the stakeholder is cause for cost overrun of the

road construction project.

5. Lack of quality

Lack of quality, the mean score is 3.79 which imply most of the respondents agree that Lack of quality is cause for cost overrun of the road construction project.

Table 4.7 below shows the ranking of causes of cost overrun according to the value of their Relative Importance Index (RII). The result shows that the first five major factors that cause road construction projects extension of time are “Design change ”, “low acceleration of project ” ,“ Contractor problem” , “Quantity underestimation”, “price escalation”, “The corruption among the stakeholder’’, “Lack of quality’’, are the first five major causes with RII value of 0.61, 0.598, 0.58,0.622,0.596,0.588 respectively.

4.3.3 Statements on effect of extension of time on cost overrun

Table 4.8 Rank of effect of extension of time on cost overrun

Item	Mean	Std. Deviation	RII	Rank
Cost overrun	4.22	0.93	0.644	1
Dispute among stakeholder	4.07	0.72	0.614	2
Total abandonment	3.63	0.83	0.546	6
Negative impact to other projects and Loss of labor productivity	3.75	0.90	0.556	5
Poor quality of work	3.99	0.79	0.58	4
Disputes between contracting parties	3.87	0.88	0.584	3

(Source: own survey 2024)

1. Cost overrun

Cost overrun, the mean score is 4.22which implies most of the respondents agree that Cost overrun one the effect on extension of time road construction project.

2. Dispute among stakeholder

Dispute among stakeholder, the mean score is 4.07 which implies most of the respondents agree that Dispute among stakeholder is the other the effect on extension of time on cost

overrun road construction project.

3. Total abandonment

   Total abandonment, the mean score is 3.63 which imply most of the respondents agree that total abandonment is the other the effect on extension of time on cost overrun road construction project.

4. Negative impact to other projects and Loss of labor productivity-Negative impact to other projects and Loss of labor productivity, the mean score is 3.75 which imply most of the respondents agree that Negative impact to other projects and Loss of labor productivity is the other the effect on extension of time on cost overrun road construction project.

5. Poor quality of work

   Poor quality of work, the mean score is 3.99 which imply most of the respondents agree that Poor quality of work is the other effect on extension of time on cost overrun road construction project.

6. Disputes between contracting parties

   Disputes between contracting parties, the mean score is 3.87 which implies most of the respondents agree that Disputes between contracting parties is the other effect on extension of time on cost overrun road construction project.Table 4.8 below shows the ranking of effect of extension of time on cost overrun according to the value of their Relative Importance Index (RII). The result shows that the first five major factors that cause road construction projects extension of time are “cost overrun ”, “dispute among stakeholder” ,“total abandonment ” , “negative impact to the other project”, “poor quality of work”, “Dispute among contractual parties ’’’, are the first six major causes with RII value of 0.644, 0.614, 0.546,0.554,0.58,0.584 respectively.

4.3.4 Statements on Resolution to Finished Project on Time and Budget Cost

Table 4.9 Rank of statement on resolution to finished project on time and budget cost

Item	Mean	Std. Deviation	RII
Direct site gatherings and meetings all the more every day and again	3.87	0.87	6
Prepare a cash flow diagram and monitoring & evaluation of the progress during the contract period and implementation or execution stage	4.14	0.81	2
Realistic and reasonable cost assessment and estimation	4.03	0.89	3
Timely advancement control, schedule control cost control, resource control by contracting and finishing date & cost	4.16	0.90	1
Increase the construction productivity	2.22	1.25	7
Give information/preparing/to untalented specialists dependent on their extent of work	3.91	0.98	5
Improving agreement grant methodology	3.99	0.84	4

1. Direct site gatherings and meetings all the more every day and again

Direct site gatherings and meetings all the more every day and again, the mean score is 3.87 which implies most of the respondents agree that Direct site gatherings and meetings all the more every day and again is resolution to finished project on time and budget cost.

2. Prepare a cash flow diagram and monitoring & evaluation of the progress during the contract period and implementation or execution stage

Prepare a cash flow diagram and monitoring & evaluation of the progress during the contract period and implementation or execution stage, the mean score is 4.14 which implies most of the respondents agree that Prepare a cash flow diagram and monitoring & evaluation of the progress during the contract period and implementation or execution stage is resolution to finished project on time and budget cost.

3.Realistic and reasonable cost assessment and estimation

Realistic and reasonable cost assessment and estimation, the mean score is 4.03 which implies most of the respondents agree that Realistic and reasonable cost assessment and estimation is resolution to finished project on time and budget cost.

4.Timely advancement control, schedule control cost control, resource control by contracting and finishing date & cost

Timely advancement control, schedule control cost control, resource control by contracting and finishing date & cost, the mean score is 4.16 which implies most of the respondents agree that Timely advancement control, schedule control cost control, resource control by contracting and finishing date & cost is resolution to finished project on time and budget cost.

5. Increase the construction productivity

Increase the construction productivity, the mean score is 2.22 which imply most of the respondents agree that Increase the construction productivity is the resolution to finished project on time and budget cost.

6. Give information/preparing/to untalented specialists dependent on their extent of work

Give information/preparing/to untalented specialists dependent on their extent of work,the mean score is 3.91 which implies most of the respondents agree that Give information/preparing/to untalented specialists dependent on their extent of work is resolution to finished project on time and budget cost.

7.Improving agreement grant methodology

Improving agreement grant methodology, the mean score is 3.99 which imply most of the respondents agree that Improving agreement grant methodology is resolution to finished project on time and budget cost.

Table 4. 9 below shows the ranking of resolution to finished project on time and budget cost are according to the value of their Relative Importance Index (RII). The result shows that the first five major factors that cause road construction projects extension of time are “Direct site gatherings and meetings all the more every day and again”, “dispute among stakeholder” ,“ Prepare a cash flow diagram and monitoring & evaluation of the progress during the contract period and implementation or execution stage” , “Realistic and

reasonable cost assessment and estimation", ".Timely advancement control, schedule control cost control, resource control by contracting and finishing date & cost", "Increase the construction productivity'',

"Increase the construction productivity'', "Increase the construction productivity' 'are the first seven major causes with RII value of 0.59, 0.63, 0.612,0.636,0.574,0.594,0.604 respectively.

4.4 Correlation Analysis

Correlation analysis investigation the linear relationship between variable .The correlation coefficient which ranges from -1 to +1.determines the strength of the correlation. The correlation direction can be either positive or negative. When higher values of one variables are accomplished by higher values of another variables, there is a positive correlation (0 and 1).negative correlation occurs when higher values of one variables are accomplished by lower values of another (-1 and 0). Table shows that coefficient Spearman correlation (0.375) that means it is positive range which is moderate agreement between extension of time and cost overrun it is positive relationship between time extension and cost overrun.

Table 4.10 Spearman correlation among independent and dependent variable

			Increase Cost overrun	Eotcause
Spearman's rho	Increase Cost overrun	Correlation Coefficient	1.000	.357**
		Sig. (2-tailed)	.	.002
		N	76	76
	Eotcause	Correlation Coefficient	.357**	1.000
		Sig. (2-tailed)	.002	.
		N	76	76

**. Correlation is significant at the 0.01 level (2-tailed).

4.5 Regression Analysis and Interpretation

To examine the effect of time extension on cost overrun was conducted. However, before preceding the regression analysis all the relevant assumptions must be tested. Therefore, the researcher has examined the following assumptions before heading to the regression.

Test 1: Linearity Test

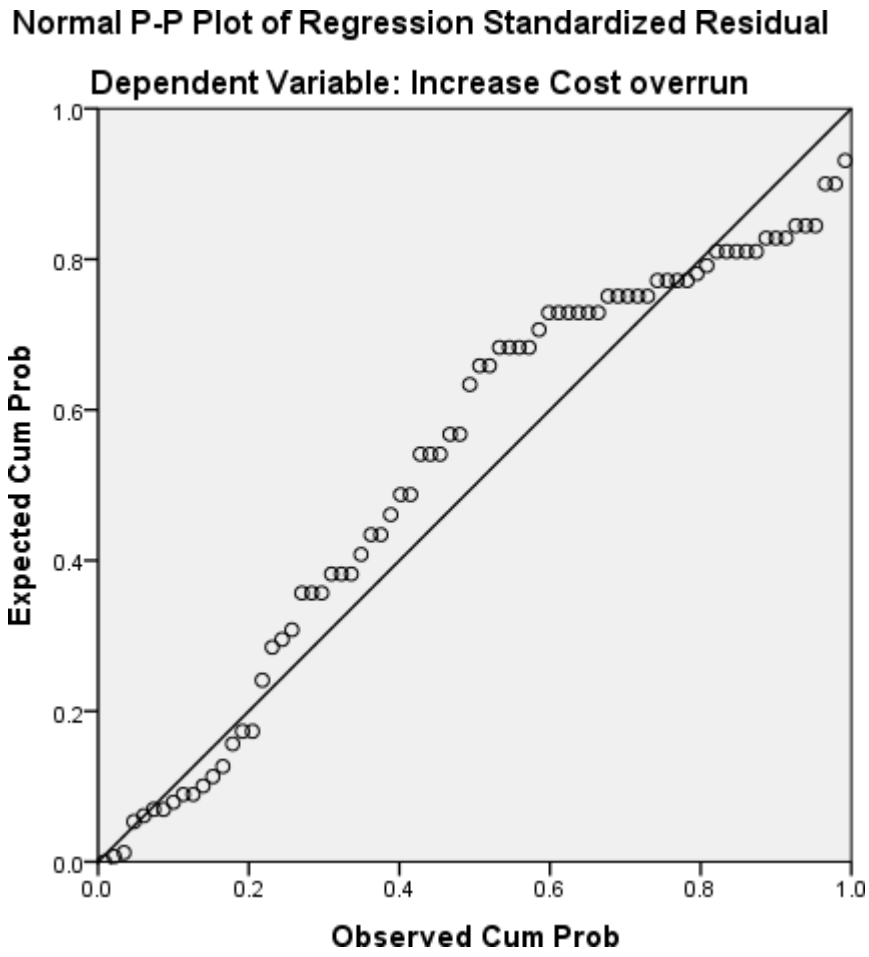

Fig 4.4 Normal P-P Plot of Standardized Residual

Normality Test

Normality test was used to determine whether the error term is normally distributed. The frequency distribution of the standardized residuals was also compared to a normal distribution. As can be seen from figure 6, although some residuals are relatively far away from the curve, many of the residuals are fairly close. Moreover, the histograms are bell-shaped which leads to infer that the residual (disturbance or errors) are normally distributed for all the models. Thus, it can be said that the assumption of normally distributed error term is not violated.

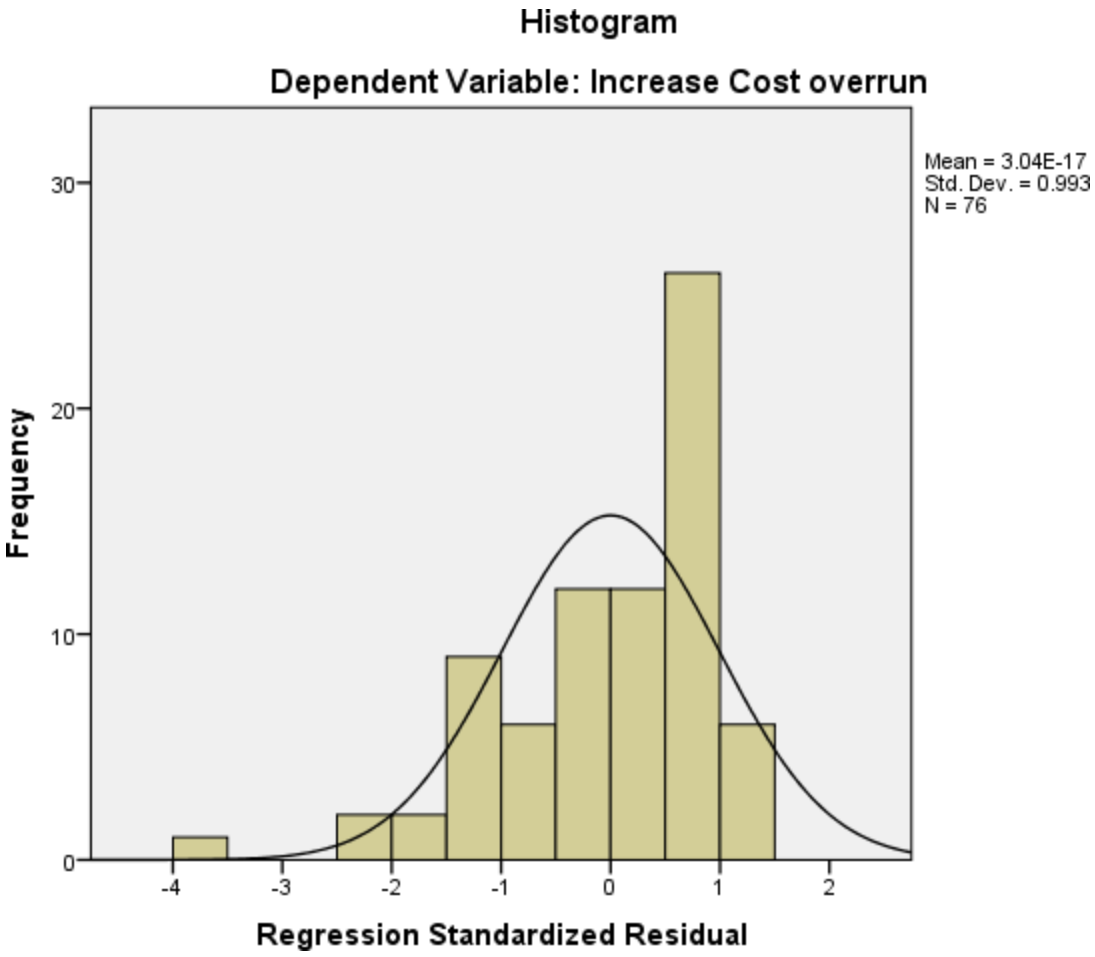

Fig 4.5 Histogram to Check Normality of Data

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4.6 Reliability Checking

To ensure reliability in this study the questionnaire adopted is compared with prior conducted studies and external factors such as fatigue and boredom will be minimized to the possible extent. cronbachs alpha is a measure of internal consistency that is how closely related as set of items are as a group. It is considered to be a measure of scale reliability. Note that Reliability coefficient of 0.7 or higher is considered acceptable. As the result shows that cronbachs Alpha is 0.852>0.7 that means study is reliable.

Table 4.11 Reliability check

Reliability Statistics	
Cronbach's Alpha	N of Items
.852	27

4.7 Discussion

From the desk study a variety of completed construction projects throughout Ethiopia were surveyed. During the desk study all the documents of each project such as correspondence letters, project report, payment certificate, the contract amount, contract time during signing of the contract actual cost and actual completion time at completion of the project were thoroughly investigated. These help to understand the reasons behind each project for extension of time, and to investigate how the actual cost at completion deviates from the contract amount. from the research we gets are:

-As the Result indicated that major causes of Eot according to the value of their Relative Importance Index (RII). The result shows that the first five major factors that cause extension of the project road construction projects are “cost overrun ”, “dispute among stakeholder” ,“total abandonment ” , “negative impact to the other project”, “poor quality of work”, “Dispute among contractual parties ’’’, are the first six major causes with RII value of 0.644, 0.614, 0.546,0.554,0.58,0.584 respectively

- From the result it show that causes of cost overrun according to the value of their Relative Importance Index (RII). The result shows that the first five major factors that cause road construction projects extension of time are “Design change ”, “low acceleration of project ” ,“ Contractor problem” , “Quantity underestimation”, “price escalation”, “The corruption among the stakeholder’’, “Lack of quality’’, are the first five major causes with RII value of 0.61, 0.598, 0.58,0.622,0.596,0.588 respectively.

-The ranking of factors that contribute to the extension of time and budget costs in road construction projects was determined using the Relative Importance Index (RII). The top five factors identified were as follows:

"Direct site gatherings and meetings all the more every day and again" (RII value:

0.59),"Dispute among stakeholders" (RII value: 0.63),"Prepare a cash flow diagram and monitoring & evaluation of the progress during the contract period and implementation or execution stage" (RII value: 0.612),"Realistic and reasonable cost assessment and estimation" (RII value: 0.636),"Timely advancement control, schedule control cost control, resource control by contracting and finishing date & cost" (RII value: 0.574). These factors highlight the importance of effective project management practices, such as regular site meetings, stakeholder management, financial monitoring, and accurate cost estimation. Moreover, controlling project advancement, schedule, resources, and construction productivity are crucial for timely completion and cost control in road construction projects.
-A ranking of factors contributing to project delays and budget overruns was conducted, using the Relative Importance Index (RII) as the measure of importance. The top five factors identified as causing road construction projects to extend beyond their scheduled completion time were: Direct site gatherings and meetings occurring more frequently, Disputes among stakeholders, Preparation of cash flow diagrams and monitoring progress during the contract period and execution stage, Realistic and reasonable cost assessment and estimation, Timely control of project advancement, schedule, cost, resources, and completion dates. Additionally, increasing construction productivity was identified as a major factor contributing to project delays and had a high RII value of 0.594.

Based on the analysis performed on the survey data, document review and interview the following finding.

Table 4.12 Variation Order of Different Project

No	Project	Original contract value [Birr]	Amount of [Birr]	Variation [%]
1	A	346262115.21	37104544.98	10.72
2	B	405973872.1	446359748.9	109.95
3	C	177338107.7	8090984	4.56
4	D	289838439.1	192278636.2	66.34
5	E	162178583	4340410.9	2.68
6	F	310979872.9	75217827.39	24.19
7	G	341179223.9	99012622.34	29.02
8	H	283224198.6	32324419.81	11.41
9	I	172533963.00	70639441	40.94
10	J	256542439.1	8251296.66	3.22
	Total	**3525123091.12**	**1071897083.48**	**30.41**

(Source; project quarterly progress Report documents)

4.7.1 statement on cause of extension of time

The respondents' documents were collected using questionnaires from clients (project owners), contractors, and consultants. There are two basic types of survey questions from which to choose: open-ended and closed-ended. This questionnaire survey has both open-ended and closed-ended questionnaires. The surveyed documents were mostly from completed projects, in which contract documents, project reports, correspondence letters, and payment certificates were investigated thoroughly, which were very important in identifying the recurrent problems related to cost in the Ethiopian building construction sector. In addition, they helped to judge how problems with the causes of cost overruns arise and how

they are documented using a random sampling technique.

4.7.2 Statement on cause of cost overrun

From the desk analysis, most of the respondents agreed that the main cause of cost overruns is the price escalation of the project, as indicated by the mean value of 4.09).As a result of the research, the main cause of the extension of the cost overrun is the price escalation of the project. (Gobana et al., 2017) proved that price escalation has its own effect on the cost overrun in the road project.

4.7.3 Statements on effect of extension of time on cost overrun

From the desk analysis most of the respondent agreed with the effect of extension of time on cost overrun is cost overrun of the project because as the result of mean value (4.22).as the result of the research that major effect of extension of time on cost overrun is cost overrun of the project. As (Gobana et al., 2017) proved that extension of time has its own effect on the cost overrun in the road project.

4.7.4 Statements on resolution to finished project on time and budget cost

from the desk analysis most of the respondent agreed resolution to finished project on time and budget cost with the is Timely advancement control, schedule control cost control, resource control by contracting and finishing date & cost because as the result of mean value (4.16).as the result of the research that resolution to finished project on time and budget cost is of the project. As (Gobanae et al ., 2017) proved that extension of time has its own effect on the costoverun in the road project. As(Belay et al.,2021), as proven that resolution to finished project on time and budget cost is schedule control cost control, resource control is the solution for controlling cost overrun. Other also the resolution to finished project on time and budget cost are Direct site gatherings and meetings all the more every day and again.

CHAPTER FIVE

Summary of Finding, Conclusion and Recommendation

This final chapter highlights the summary of findings, conclusion drawn and recommendation have been given as per the findings of the assessment to improve the schedule delay and cost performance in the IFH, ECWC, Melcon contractor.

5.1 Summary of Findings

- The major purpose of the study was to identify the causes of extension of time and cost overrun in IFH, ECWC , Melcon contractor. Furthermore, the research aimed to assess the cause of extension of time and cost overrun in IFH, ECWC, Melcon contractor construction projects with respect to the project original duration and contract amount of engineering and also to identified the major causes (reasons) and impacts for extension of time on cost estimation of the projects and made resolution methods or mitigation measures for extension of time and cost overrun. In this study the analysis done on general issues of project schedule management revealed that majority of the respondents are in agreement with that the proper planning and activity identification were not done.
- Regarding the cause of extension of time, eight significant causes were identified. Namely, Delays of project, management problem, contractor problem, lack of resource, government agencies, lack of commitment, other external related factors, design related factors. Based on the rank of relative importance index; the major causes of extension of time are delays of project, management problem, lack of resource ,design related problem, government agencies, lack of commitment, contractor problem and other external factor.
- The major cause of cost overrun are price escalation, design change, low accretion of project ,corruption among stakeholder ,lack of quality, quantity underestimation, .The major effect of extension of time on cost overrun are cost overrun, dispute among stakeholder ,dispute between contracting parties ,poor quality of work, negative impact to other project and loss of labour productivity, total abandonment. additional the resolution to finished project on time and budget cost are timely advancement control, schedule control,cost control, resource control by finishing on time and on the specific budget cost, prepare cash flow diagram and monitoring and evaluation of the progress during the contracting period and implementation or

execute stage, realistic and reasonable cost assessment and estimation, improving agreement, give information preparing to untalented

- specialist depend ,direct site gathering and meeting all the more every day and again, increase the construction productivity.
- Analysis was also carried out on the impact of extension on the project work. Delays of project, price escalation, cost overrun, timely advancement control, schedule.

- Control, cost control, resource control by contracting and finishing date and cost. delays of project is the major cause for cost overrun and extension of time.

5.2 Conclusion

Based on the findings and data analysis of the research, several conclusions can be drawn regarding the time and cost management and the reasons behind the extension of time and cost overrun in the project.

- Causes of Time Overruns: The research identified various factors contributing to time overruns, including delays in project execution, poor site management and supervision, lack of resources, incomplete drawings and design, government agencies' involvement, lack of commitment, contractor problems, and other external factors.
- Causes of Cost Overruns: The major causes of cost overruns were found to be price escalation, design changes, low project acceleration, corruption among stakeholders, lack of quality, and quantity underestimation.
- Effects of Time Extension on Cost overrun: Time extensions were found to have several negative effects, including cost overruns, disputes among stakeholders, disputes between contracting parties, poor quality of work, negative impacts on other projects, and loss of labor productivity.
- Resolution to Time and Cost Management Issues: The study suggests several mitigation measures to minimize or avoid schedule delays and cost overruns. These measures include timely advancement control, schedule control, cost control, resource control by contracting, adherence to project timelines and budgets, realistic cost assessment and estimation, improving agreements, providing information to specialists based on their scope of work,

increasing construction productivity, and implementing cash flow diagrams for monitoring and evaluating progress.

In conclusion, the identified problems related to the extension of time and cost overrun can be addressed by implementing the mitigation methods mentioned above. By effectively controlling and managing various aspects of the project, such as schedule, cost, resources, and agreements, it is possible to minimize or avoid these issues and ensure successful project completion within the allocated time and budget.

5.3 Recommendations

The problems of extension time and cost overrun are influencing the Road construction at Addis Ababa. All stakeholders (clients, contractors and consultants) should cooperate to accomplish successful projects within the specified time frame and budget, surpass the anticipated quality standard. Particularly competent project team and construction managers "should give close consideration to planning and preventive activity to keep the construction project on budget and schedule, and play an important role in keeping projects from extension of time or additional expense. For that reason, executing quality administration framework through talented, able and reliable project managers is imperative, since project managers are the individuals who are occupied with the overall planning, coordination, monitor of risks and control of a project from starting to finish. So as to minimize the occurrences of extension of time and cost overrun of the Road construction, the company should:

- Contractor should prepare proper plan and achieve schedule using the appropriate scheduling techniques and revise as appropriate;
- Contractor must also allocate adequate construction equipment's and ensure to avoid the shortage of construction material .The contractor should mobilize resources without delay; Consultants shall ensure that the documents or design & specifications issued by consultants to contractors are free from mistakes or discrepancies and any design error must be rectified immediately to avoid delay in the progress of project works;
- Clients and consultants should also promptly respond to contracts enquires in revising and

approving documents (design, drawings, submittals, sample material tests etc..)without delay;

- The clients must ensure that sufficient contingency is available on the client‟s side to spend on speeding up or accelerating costs in case of any delay;

- The clients must ensure that the contractor handover the site to contractors immediately after contract agreement has signed Include all the partners and stakeholders in settling project related decisions with respect to time and cost. The project team members, the end users, top management, any individual who influences or who is influenced by the project ought to be included; Set performance necessities for choosing project participants i.e. skillful consultants (advisors) and well performing and experienced contractors;

- Implement different tasks through appropriate coordination and control of planning, design, estimating, contracting and construction in the whole cycle;

- Create effective systems and communication channels so that delay in choice can be limited and furthermore for powerful time and cost control for settling clashes that can‟t be dodge; Giving training to the project group will likewise diminish or minimize mistaken assumptions and confusions which will support them with settling on choices rapidly and deliver the project on schedule and within budget (cost).

Further studies are recommended to be embraced in other areas of Addis Ababa Road projects to come up with a nationwide mechanism for limiting extension of time and cost overruns in general construction industry.

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Appendix I

Addis College Department of Construction Technology and Management Postgraduate in Construction Management

Dear respondents,

Thank you for agreeing to take part in conducting the research under the title" The effect of time extension on Cost Overrun : The Case of selected road project in Addis Ababa."

My name is Birhanu Hailu, currently pursuing my master's in Construction management at Addis College .By assuring you that your information will be used only for academic research purposes and confidentiality of your response is 100% granted, I kindly request you to answer the entire questions provided below believing that the quality of this research findings highly depends on your honest and accurate information. The Estimated time take is 10 to 15 minutes.

Thank you again for your generous time!

General direction:

- Please check that the paper has two sections and six pages
- Please do not write your name
- Please Put "X" mark on your choice
- If you cannot get a satisfying choice among the given alternatives, please write your answer in the space provided at the end of the questioner.

Section I

Back ground information of respondents

1.Gender Male ☐ Female ☐

2.Age ☐ 24-33 ☐ 34-43 ☐ 44-53 ☐ 54-63 Above ☐

3.Educational back ground

Diploma ☐ BA/BSc ☐ MA/MSc ☐

PhD ☐ If other please specify

4.What is the type of the organization or company you are currently working at?

Client ☐ Contractor ☐ Consultant ☐

5.Role/ position in the project work

☐ Project manager ☐ Office engineer ☐ Site engineer

if others please specify _____

Section II

The following statements are on extension of time on cost estimation. Please indicate your level of agreement to the statements using the scale “strongly agree(5)", "agree(4)", "neutral(3)”, "disagree(2)" and" strongly disagree(1)".

No.	Statement	Level agreement				
		Strongly Agree (5)	Agree(4)	Neutral (3)	Disagree (2)	Strongly Disagree (1)
Statements on cause of extension of time						
1	Delays of project whether in side of contractor related, consultant related and client related problem					
2	Management problem					
3	Contractor problem					

4	Lack of resource					
5	The government agenicies					
6	Lack of commitement					
7	Other external factors related problem					
8	Design related problem					
Statements on cause Of cost overrun						
1	Design change					
2	Low Acceleration of project					
3	Quantity underestimation					
4	Price escalation					
5	Corruption among the stakeholder					
6	Lack of quality					
Statements on effect of extension of time on cost overrun						
1	Cost overrun					
2	Dispute among stakeholder					
3	Total abandonment					
4	Negative impact to other projects and Loss of labor productivity					
5	Poor quality of work					
6	Idling capital and Resources,					

7	Disputes between contracting parties					
Statements on resolution to finished project on time and budget cost						
1	Direct site gatherings and meetings all the more every day and again					
2	Prepare a cash flow diagram and monitoring & evaluation of the progress during the contract period and implementation or execution stage					
3	Realistic and reasonable cost assessment and estimation					
4	Timely advancement control, schedule control cost control, resource control by contracting and finishing date & cost					
5	Increase the construction productivity					
6	Give information/preparing/to untalented specialists dependent on their extent of work					
7	Improving agreement grant methodology					